Weekly Report

4th, Dec. - 10th, Dec. 2017

Done:

1. This week focus on learning the front-end frameworks and thinking & discussion about the currently available data.

2. On learning the frameworks: Understood the core concepts of ReactJS after practicing with the official doc and read four blogs on the concepts. Begin to learn VueJS. I archived all the coding files and notes online for review. Once I master the minimal necessary concepts I will begin writing the system.

3 A very rough design

4 Notes and Discussion:

Some Notes on fire data

1. **Data Source**

Besides fire reports data, fire spots/perimeter data, weather data (including like wind/temperature, air quality fire weather forecasting), I think we should add **smoke** data (perimeter data, textual description) and **fuel** data.

Categorization of data(A=archived, R=real time)

1. Event data (fire reports, smoke reports → textual data; may also be in other forms like photos) A
    - They needed to be correctly correlated to fires
    - Extract keyword, or topics, for retrieving data
2. Geographical data (fire hotspots, perimeters, smoke area etc.) A R
    - must be shown on a map
3. Geo-related data (like humidity, wind speed/direction, temperature, at different **regions**. A R
    - we can encode them on the map
    - if at a specific time/space, they may be shown in charts which are put aside

TODO:

4. Image data (some satellite images, photos of forests) A R
5. Social media data A R

2. Data Access / Data Storage / Data Processing

As a start, we may restrict the area to be studied to California state. Also, since fire parameter data begin at 21st century, the time span is also restricted. We can focus on those months which wildfire occurs more frequently.

There are several **uncertainty issues** in the data:

a. Data with different time / space granularity
b. Data from different sources / in different formats [like report data from two sites / fire records from two sites with different recording types (fire point/ fire perimeter)]

Especially, data from different sources divide one place in different ways.

c. Data with different confidence levels (some satellite data have different confidence on observed data)

When we store these data in the database, what should be the **index** if we want to query and render? Locations, fire events, or timestamps? This involves database techniques and user requirements.

If we need real-time data, how to fuse the data efficiently? Currently I think it will help if the data can be organized in the above categorization way. But we still need to consider the data alignment, remove uncertainties in a relatively short time. I should seek some experts to help.

In real usage scenarios, if for ***retrospective*** analysis, data can be retrieved from a databased and rendered.

For ***predictive*** analysis, data will stream in. Among the different data I found so far, weather related data are most frequently updated; other data may update on one or two times a day. Most of the data need crawling/downloading; few can be accessed by API.

3. Data Analysis / Visualization

Display Map needs to be the base layer in the main view. Users query, and the system display the results. Too many data layers and encodings will result in visual cluster, and users may lose mental map.

Recommendation Prediction can utilize 7 prior days data, and historical data shares some similarities with current conditions. Here, similarities can be multifaceted. Like similar regions / fuel type regions / months of a year / weather conditions, based on different data categories (even include textual data (event)). We or users can define different **metrics** of similarities, and do recommendations.

Comparison Users can compare among the recommendations / query results. Comparison can be made in side-by-side way, or juxtaposition, or difference. Contextual information should be provided on the map or in another view.

Comparisons can be made under same data categories. For example, fire spots data and fire perimeter data. There may be inconsistencies between them, and even modify them.
If we adopt some models later, comparisons can also be made between prediction results; between one prediction result and historical fire records.

Visual Correlations Some events (like weather conditions) may lead to the occurrence of other events. Visually encoding the correlations and also recommendations can be made to help analysis.

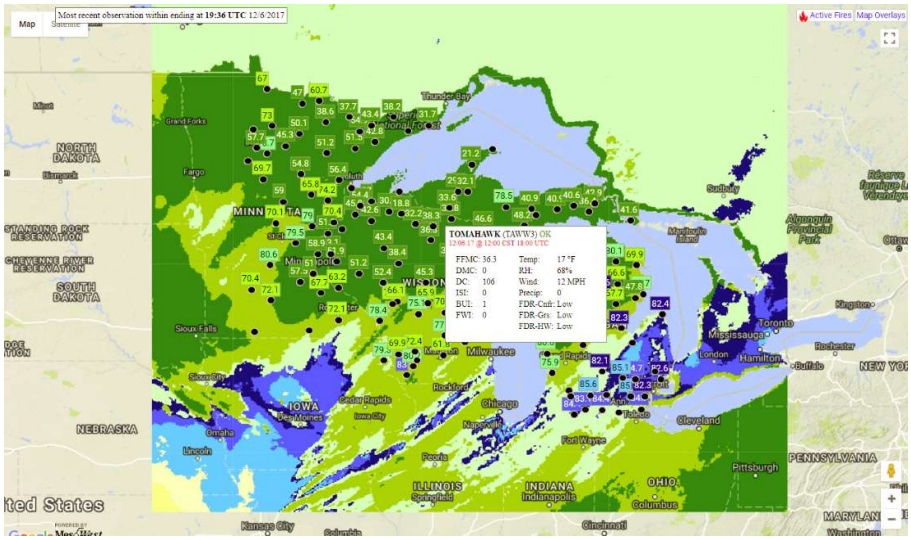
Tool bar:
Selection / Filter Choose what to display, set filtering parameters, etc.

History / Review Users are able to save or retrieve their exploration and discovery findings in a specific format.

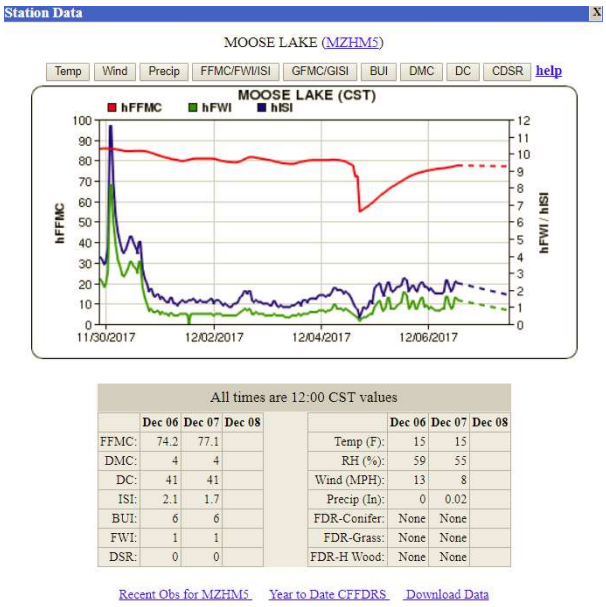
Currently, social media data and satellite image data are not included. Social media maybe helpful in real-time emergency management (detect fire event using keywords; social network features). Image data may also function as an alert.

Some fire products

Great Lakes Fire http://glffc.utah.edu/cgi-bin/gl.cgi
Fuels. Along with weather, and fire behavior related indexes (proposed by Canadian Forest Fire Weather Index).



Clicking at one label shows:

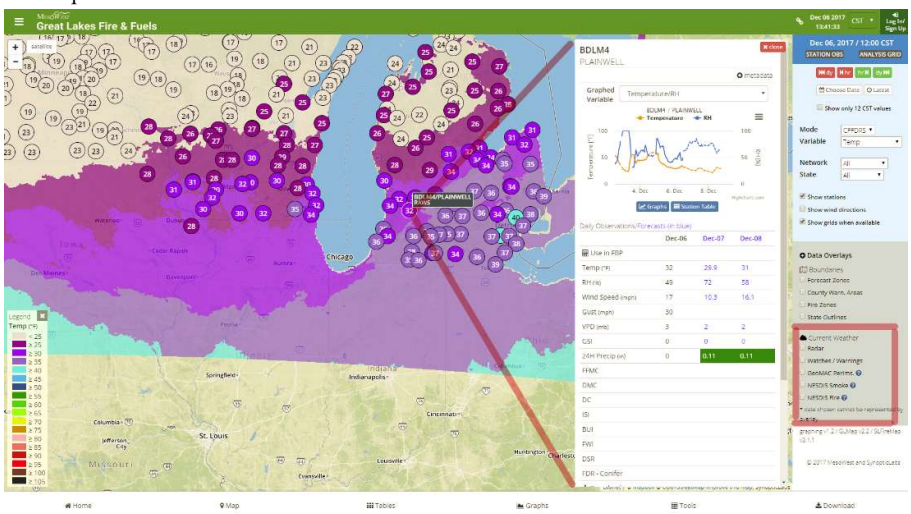


All times are 12:00 CST values

	Dec 06	Dec 07	Dec 08		Dec 06	Dec 07	Dec 08
FFMC:	74.2	77.1		Temp (F):	15	15	
DMC:	4	4		RH (%):	59	55	
DC:	41	41		Wind (MPH):	13	8	
ISI:	2.1	1.7		Precip (In):	0	0.02	
BUI:	6	6		FDR-Conifer:	None	None	
FWI:	1	1		FDR-Grass:	None	None	
DSR:	0	0		FDR-H Wood:	None	None	

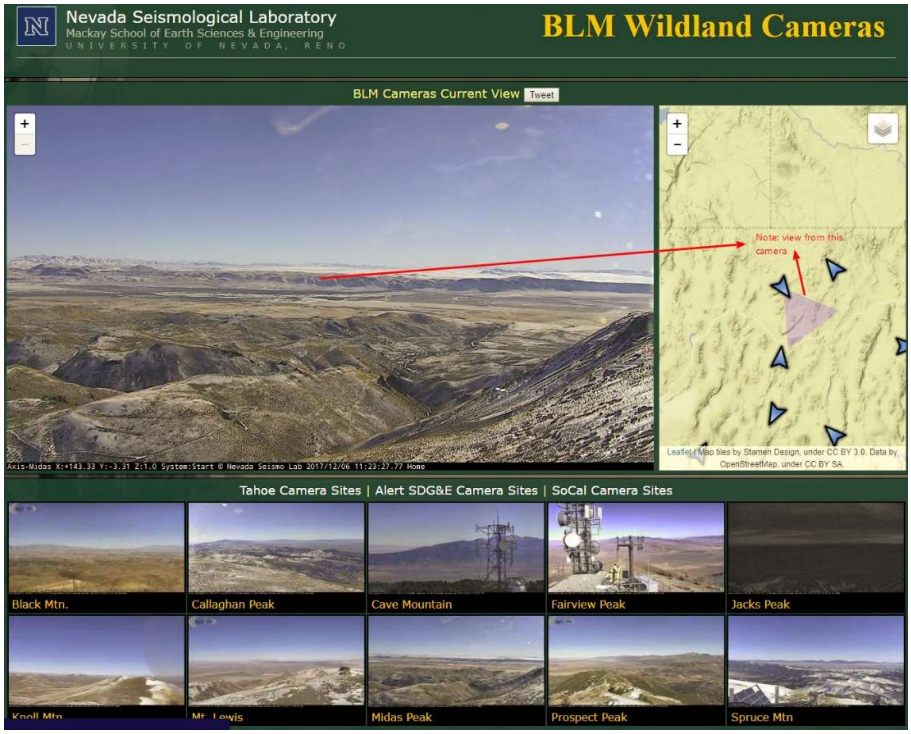
Recent Obs for MZHM5 Year to Date CFFDRS Download Data

An improved version:

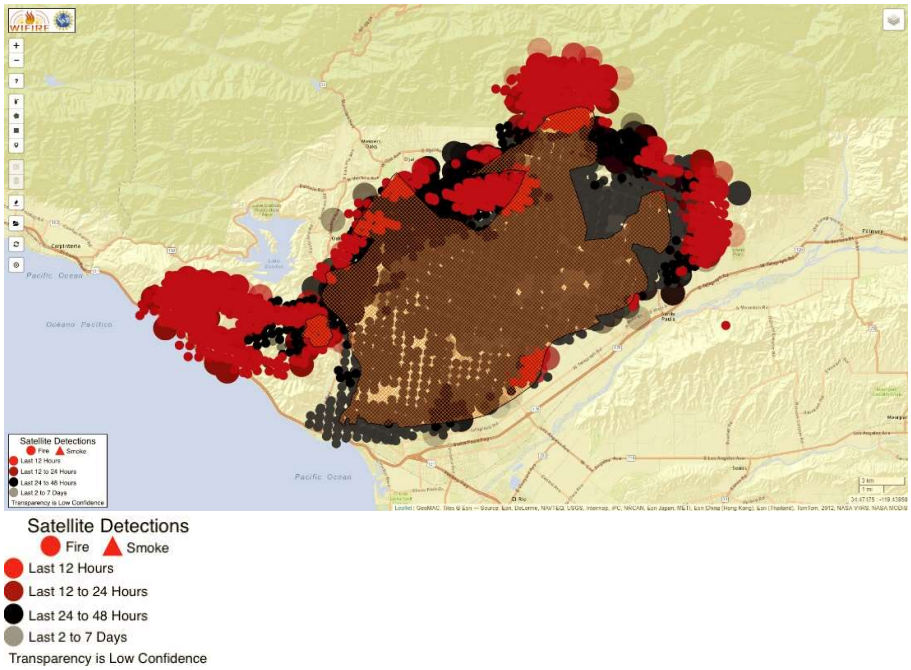


Nevada Seismological Lab; BLM Wildland cameras

http://www.alertwildfire.org/blmnv/



Firemap (WIFIRE)

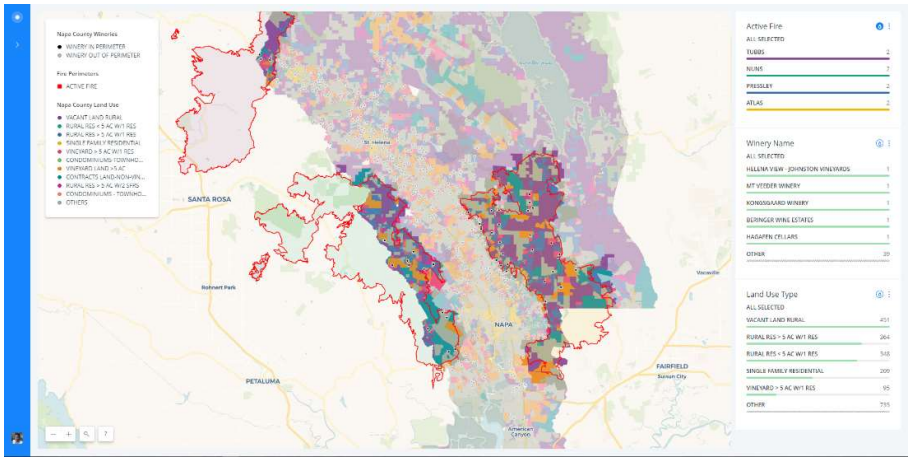


Perimeter (orange grids)

Spot with different transparency, different size, different color (MODIS detection)

Also smoke data

Perimeters, along with different wineries, with color-encoded winery types.



To Do:

1. Download / Crawl data.
2. Build a framework of system based on the very rough design.

Paper reading

安排表

内容	DDL	Milestone
设计搭建框架	12.10	先选了基本的三大类数据
前后端学习	A.S.A.P	学习了 react 基本概念和 vue 入门的知识，写了一些基本的例程